

REMARKS

Reconsideration of the rejections set forth in the Office Action dated January 15, 2004, is respectfully requested in view of the preceding amendments and the following remarks. By this amendment, claim 1 has been amended. Currently, claims 1-37 are pending in this application, of which claims 1, 9-10, 18, and 25-37 correspond to the elected species.

The Examiner renumbered claims 1 and 3-38 as claims 1-37. Applicants have amended the dependencies of the claims to reflect the new numbering of the claims.

Rejection under 35 USC 102

Claims 1, 9, and 25-26 were rejected under 35 USC 102 as anticipated by Fujita, et al. (U.S. Patent No. 6,570,685). This rejection is respectfully traversed in view of the amendment to claim 1 and the following arguments.

This application relates to a protection switching arrangement for an optical switching system that provides a way to protect optical signals by providing alternative switching paths within the optical switching system. (Specification at page 2, lines 26-29). This allows a failure of one of the paths within the switch to be accommodated by enabling a redundant path within the network switch to be used to handle the failing path. (Specification at page 6, lines 26-34). Thus, if one of the switching paths within the optical switching system fails, an alternative path within the switching system may be used to handle that failing path. For example, if one of the demultiplexers in the optical switching system were to fail, the protection switching system would allow a spare demultiplexer to be used to handle the optical traffic that would have been handled by the failing demultiplexer.

Fujita does not teach a system for providing alternative switching paths within an optical switching system. Rather, in Fujita, the optical paths are all used by signals being transmitted in a SONET ring. Specifically, looking at Fig. 3, as is well known, in a four fiber SONET ring, the ring contains four optical paths: Working West, Working East, Protection West, and Protection East. These four paths are represented in Fig. 3 of Fujita by reference numerals 102-1, 102-2, 102-3, and 102-4 (Fujita at col. 9, lines 50-53).

The optical switch includes ingress and egress switches (111, and 112) to allow traffic to be switched between the working and protection paths. Four optical paths through the optical switch are also included – one for each of the working and protection paths on the SONET ring.

For example, looking at the top path, the optical path includes a demultiplexer 152, an optical add drop multiplexer made up of several 2x2 switches (122-1 to 122-n) to enable signals to be pulled off and added to the working east path at the optical node, and a multiplexer 153 to enable the signals from the add drop multiplexers to be recombined to be transmitted out over the working and protection paths. (Fujita at col. 10, lines 30-46).

Thus, the entire optical signal including many lambdas from one of the fibers on the SONET ring is input to one of the optical planes where it is decomposed by the demultiplexer 152, signals are added or taken off through the use of the add-drop multiplexers 121, and then the signal is recombined at the multiplexer 153. Since there are four optical paths required to be carried in a four fiber SONET ring, the four optical planes in the optical switch of Fig. 3 of Fujita are each required to be operational for the optical switch to be considered operational on the SONET ring. Failure of one of the optical planes on the switch will not cause a spare optical plane to be used, but rather will cause a ring switch or a span switch to thus cause the SONET traffic that would have gone through that plane to be switched onto protection from working or onto working from protection at the node.

The Examiner has taken the position that Fujita anticipates claim 1 of this application. Applicants respectfully disagree for several reasons. First, the Examiner has taken the position that Fujita teaches a plurality of optical switching matrices having multiple inputs and multiple outputs and being operable to optical channel signals from any one of a plurality of the inputs to any one of a plurality of the outputs. As support for this assertion, the Examiner has cited optical switches 121-1 to 121-n of Fig. 3.

The optical switches 121-1 to 121-n of Fig. 3 are not configured to switch optical channel signals from any one of a plurality of inputs to any one of the plurality of outputs. Rather, Fujita states that these elements are 2x2 optical add/drop multiplexers consisting of 2x2 optical switches connected to the fibers and to the optical transmission apparatuses 167-1 to 167-3. (Fujita at col. 10, lines 34-46). The transmission apparatuses allow signals to be taken off and added to the working and protection paths on the SONET ring. (Fujita at col. 10, line 54 to col. 11, line 2). Accordingly, the add/drop multiplexers 121-1 to 121-n do not allow optical channel signals to be switched from any of the plurality of inputs to any of the plurality of outputs, but rather allow signals to be taken off and added to the working and protection paths. The inputs and outputs thus form straight-through paths, and are not configured such that signals from any

one of a plurality of the inputs may be switched to any one of the plurality of outputs. Span and ring protection switching is handled at the ingress and egress switches 111, 112, not by the add/drop multiplexers cited by the Examiner.

Claim 1 has been amended to recite that the plurality of optical switching matrices are operable to switch optical channel signals from any one of a plurality of the inputs to any one of the plurality of outputs. In view of the fact that the add/drop multiplexers of Fujita cited by the examiner are not operable to perform this function, applicants respectfully submit that claim 1 is not anticipated by Fujita.

Additionally, applicants respectfully submit that Fujita fails to teach or suggest a spare wavelength division demultiplexer. The Examiner has taken the position that Fujita teaches this aspect of claim 1, citing wavelength division demultiplexer 160 of Fig. 3. As discussed above, Fujita has four optical planes, two for working traffic and two for protection traffic. The protection traffic in a SONET ring is required to be carried by the network element to protect against failure at any location in the ring. The protection path within the network element is therefore not a spare path, as that term is commonly used, but rather is a path that is used by the network element to handle traffic in the SONET ring. The demultiplexer 160 cited by the Examiner is part of the optical plane that handles protection traffic in a clockwise direction and is not a spare demultiplexer.

Additionally, the demultiplexer 160 does not have its outputs coupled to the inputs of the plurality of optical switching matrices (which the Examiner stated were ADMs 121-1 to 121-n). Rather, the demultiplexer 161 has its outputs coupled to other add drop multiplexers 123-1 to 123-n that form a different optical plane. (Fujita at col. 10, lines 38-44). Accordingly, this aspect of claim 1 also is not taught by Fujita.

Finally, Fujita fails to teach or suggest at least one optical protection switch having a plurality of straight through inputs and outputs, and at least one protection output. As support for the rejection, the Examiner cited 4 x 4 switches 111 and 112. These switches do not have more outputs than inputs as recited in claim 1. Rather, they have four inputs connected to the optical fibers, and four outputs connected to the optical planes discussed above. Thus, these optical switches do not have a plurality of inputs, a plurality of straight-through outputs, and at least one protection output as recited in claim 1.

For all these reasons, applicants respectfully submit that Fujita fails to anticipate independent claim 1. Since claim 9 depends from claim 1, Fujita also fails to anticipate claim 9 for at least these same reasons. Accordingly, applicants respectfully request that the rejection of claims 1 and 9 be withdrawn.

Independent claim 25 recites a protection switching arrangement including a plurality of input demultiplexers, at least one of the plurality forming a spare input demultiplexer; and at least one first optical protection switch having a plurality of inputs and a plurality of outputs, at least one of the plurality of outputs forming a spare output. Fujita fails to teach a spare demultiplexer, since all of the demultiplexers in Fujita are used to carry traffic on the SONET ring. Additionally, Fujita fails to teach a first optical protection switch having a spare output. Rather, Fujita as discussed above, the network element in Fujita connects to four optical fibers and the switch connecting to the four optical fibers has four outputs. Thus, there is no spare output from the switch 111 in Fujita. Accordingly, for these reasons, applicants respectfully submit that independent claim 25 is not anticipated by Fujita.

Claim 26 recites that the first optical protection switch is operable to couple an input associated with a faulty input demultiplexer to the spare output, to enable the spare demultiplexer to serve as a backup for the faulty input demultiplexer. The Examiner has taken the position that this claim is anticipated since the switch 111 is configured to enable traffic from the working east optical fiber to be shifted to the optical plane associated with protection east traffic, presumably because of a need to perform a span failure on the working east path. Applicants respectfully submit that a dedicated optical plane associated with the protection path is not a "spare" since it is used to handle traffic and its failure would affect operation of the ring. A failure in a spare, by contrast, would not affect operation of the network element absent another failure that would cause the spare to be needed. Accordingly, for this additional reason, applicants respectfully submit that claim 26 is not anticipated by Fujita.

Rejection of claims 10, 18, and 27-37 under 35 USC 103

Claims 10, 18, and 27-37 were rejected under 35 USC 103 as unpatentable over Fujita in view of Kuroyanagi (U.S. Patent No. 6,433,900). This rejection is respectfully traversed in view of the amendments to the claims and the following arguments.

Initially, applicants note that claim 10 and 18 depend from claim 1, and that claims 27-37 depend from claim 25, both of which are discussed in some detail above. Since Kuroyanagi fails to make up for the deficiencies noted above, applicants respectfully submit that these claims should be allowable as well.

With respect to claim 10, the Examiner has acknowledged that Fujita fails to teach or suggest a plurality of optical protection switches corresponding to the optical demultiplexers, but contends that Kuroyanagi teaches such a system and that it would have been obvious to combine the two references, citing Fig. 14 and the text at col. 16, lines 4-67, and at col. 17, lines 1-35 of Kuroyanagi. Applicants respectfully disagree.

The portion of Kuroyanagi cited by the Examiner relates to a one-to-one protection arrangement similar to the protection arrangement discussed in the instant specification with respect to Fig. 1. Specifically, as noted by applicants, a one-to-one protection arrangement requires the entire switch core to be replicated, which thereby doubles the cost of the switching core. (Specification at page 5, lines 15-22). Similarly, Kuroyanagi teaches in Fig. 14 that the optical switch should have two optical switching systems (a 0-system and a 1-system) and that each system should have its own optical cross connect node. A person of ordinary skill in the art looking to avoid the expense and problems associated with a one-to-one protection system would not have been motivated to combine that sort of a system with an optical system, such as that disclosed by Fujita, since doing so would have resulted in an optical system that still had a one-to-one protection arrangement. Accordingly, for this additional reason, applicants respectfully submit that these claims would not have been obvious over the art of record.

Conclusion

Applicant respectfully submits that the claims pending in this application are in condition for allowance and respectfully requests an action to that effect. If the Examiner believes a telephone interview would further prosecution of this application, the Examiner is respectfully requested to contact the undersigned at the number indicated below.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below. If any fees are due in connection with this filing, the Commissioner is hereby authorized to charge

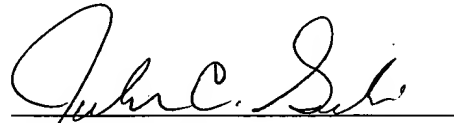
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payment of the fees associated with this communication or credit any overpayment to Deposit
Account No. 502246 (Ref: NN-12728).

Respectfully Submitted

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